CLAIMS

We claim:

1. A method for preparing a lubricated surface of an article to reduce the break-out force and sliding frictional force, comprising:
   (a) providing one or more surfaces;
   (b) applying a lubricant to at least one of the surfaces to form a coated surface;
   (c) exposing the coated surface to an energy source at about atmospheric pressure.
2. The method of claim 1 further comprising mixing the lubricant with a solvent to form a lubricant-solvent solution prior to applying the lubricant to the surface, the weight percent lubricant in the lubricant-solvent solution ranging from about 0.1 to about 95, in addition ranging from about 0.5 to about 50, and further in addition ranging from about 0.5 to about 10.
3. The method of claim 2 further comprising heating the coated surface to evaporate the solvent in the lubricant-solvent solution at a temperature ranging from about ambient to about 150°C, in addition ranging from about 80°C to about 130°C, for a period of time ranging from about 0.5 minute to about 60 minutes, in addition ranging from about 0.5 minute to about 40 minutes, and further in addition ranging from about 0.5 minute to about 30 minutes, the heating step occurring after applying the lubricant-solvent solution to the surface and prior to exposing the coated surface to the energy source.
4. The method of claim 1 wherein the lubricant is selected from one or more groups comprising a fluorochemical compound, a perfluoropolyether compound, a functionalized perfluoropolyether compound, and a polysiloxane-based compound.
5. The method of claim 1 wherein the lubricant contains additives selected from one or more groups comprising free radical initiators, viscosity modifiers, surfactants, wetting agents, anticorrosive agents, antioxidants, antiwear agents, buffering agents, and dyes.
6. The method of claim 1 wherein the energy source is an ionizing gas plasma.
7. The method of claim 1 wherein the energy source is ionizing radiation.

8. The method of claim 6 wherein the gas is selected from one or more groups comprising helium, neon, argon, krypton, air, oxygen, carbon dioxide, carbon monoxide, water vapor, nitrogen, and hydrogen.

9. The method of claim 1 further comprising additionally exposing the surface to the ionizing gas plasma prior to applying the lubricant.

10. An article having reduced break-out force and reduced sliding frictional force comprising one or more surfaces and a lubricant applied to at least one of the surfaces, the lubricant-coated surface subsequently exposed to an energy source at about atmospheric pressure.

11. The article of claim 10 wherein the lubricant is mixed with a solvent to form a lubricant-solvent solution prior to applying the lubricant to the surface, the weight percent lubricant in the lubricant-solvent solution ranging from about 0.1 to about 95, in addition ranging from about 0.5 to about 50, and further in addition ranging from about 0.5 to about 10.

12. The article of claim 11 wherein the coated surface is heated to evaporate the solvent in the lubricant-solvent solution at a temperature ranging from about ambient to about 150°C, in addition ranging from about 80°C to about 130°C, for a period of time ranging from about 0.5 minute to about 60 minutes, in addition ranging from about 0.5 minute to about 40 minutes, and further in addition ranging from about 0.5 minute to about 30 minutes, the heating step occurring after applying the lubricant-solvent solution to the surface and prior to exposing the coated surface to the energy source.

13. The article of claim 10 wherein the lubricant is selected from one or more groups comprising a fluorochemical compound, a perfluoropolyether compound, a functionalized perfluoropolyether compound, and a polysiloxane-based compound.

14. The article of claim 10 wherein the lubricant contains additives selected from one or more groups comprising free radical initiators, viscosity modifiers, surfactants, wetting agents, anticorrosive agents, antioxidants, antiwear agents, buffering agents, and dyes.

15. The article of claim 10 wherein the energy source is an ionizing gas plasma.

16. The article of claim 10 wherein the energy source is ionizing radiation.

17. The article of claim 15 wherein the gas is selected from one or more groups comprising helium, neon, argon, krypton, air, oxygen, carbon dioxide, carbon monoxide, water vapor, nitrogen, and hydrogen.

18. The article of claim 10 wherein the surface is additionally exposed to the ionizing gas plasma prior to applying the lubricant.

19. A method for preparing a lubricated surface of an article to reduce the break-out force and sliding frictional force, comprising:

(a) providing one or more surfaces;

(b) exposing at least one of the surfaces to an ionizing gas plasma at about atmospheric pressure to form a plasma-treated surface;

(c) applying a lubricant to the plasma-treated surface to form a coated surface;

20. The method of claim 19 further comprising mixing the lubricant with a solvent to form a lubricant-solvent solution prior to applying the lubricant to the surface, the weight percent lubricant in the lubricant-solvent solution ranging from about 0.1 to about 95, in addition ranging from about 0.5 to about 50, and further in addition ranging from about 0.5 to about 10.

21. The method of claim 19 wherein the lubricant is selected from one or more groups comprising a fluorochemical compound, a perfluoropolyether compound, a functionalized perfluoropolyether compound, and a polysiloxane-based compound.

22. The method of claim 19 wherein the lubricant contains additives selected from one or more groups comprising free radical initiators, viscosity modifiers, surfactants, wetting agents, anticorrosive agents, antioxidants, antiwear agents, buffering agents, and dyes.

23. The method of claim 19 wherein the gas is selected from one or more groups comprising helium, neon, argon, krypton, air, oxygen, carbon dioxide, carbon monoxide, water vapor, nitrogen, and hydrogen.

24. The method of claim 20 wherein the coated surface is heated to evaporate the solvent in the lubricant-solvent solution at a temperature ranging from about ambient to about 150°C, in addition ranging from about 80°C to about 130°C, for a period of time ranging from about 0.5 minute to about 60 minutes, in addition ranging from about 0.5 minute to

about 40 minutes, and further in addition ranging from about 0.5 minute to about 30 minutes, the heating step occurring after applying the lubricant-solvent solution to the surface.

25. An article having reduced break-out force and reduced sliding frictional force comprising one or more surfaces, at least one of the surfaces exposed to an ionizing gas plasma at about atmospheric pressure and a lubricant applied to the plasma-treated surface to form a coated surface.

26. The article of claim 25 wherein the gas is selected from one or more groups comprising helium, neon, argon, krypton, air, oxygen, carbon dioxide, carbon monoxide, water vapor, nitrogen, and hydrogen.

27. The article of claim 25 wherein the lubricant is mixed with a solvent to form a lubricant-solvent solution prior to applying the lubricant to the surface, the weight percent lubricant in the lubricant-solvent solution ranging from about 0.1 to about 95, in addition ranging from about 0.5 to about 50, and further in addition ranging from about 0.5 to about 10.

28. The article of claim 27 wherein the coated surface is heated to evaporate the solvent in the lubricant-solvent solution at a temperature ranging from about ambient to about 150°C, in addition ranging from about 80°C to about 130°C, for a period of time ranging from about 0.5 minute to about 60 minutes, in addition ranging from about 0.5 minute to about 40 minutes, and further in addition ranging from about 0.5 minute to about 30 minutes, the heating step occurring after applying the lubricant-solvent solution to the surface.

29. The article of claim 25 wherein the lubricant is selected from one or more groups comprising a fluorochemical compound, a perfluoropolyether compound, a functionalized perfluoropolyether compound, and a polysiloxane-based compound.

30. The article of claim 25 wherein the lubricant contains additives selected from one or more groups comprising free radical initiators, viscosity modifiers, surfactants, wetting agents, anticorrosive agents, antioxidants, antiwear agents, buffering agents, and dyes.

31. The article of claim 25 wherein the gas is selected from one or more groups comprising helium, neon, argon, krypton, air, oxygen, carbon dioxide, carbon monoxide, water vapor, nitrogen, and hydrogen.